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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,465	07/18/2003	Hiroyoshi Funato	R2184.0056/P056-B	1137
24998	7590	10/07/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			CHANG, AUDREY Y	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	

2872

DATE MAILED: 10/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/621,465	Applicant(s) FUNATO, HIROYOSHI	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on July 29, 2004, which has been entered into the file.
- By this amendment, the applicant has amended claims 30, 43, 44 and 47.
- Claims 30-47 remain pending in this application.
- The objections to the drawings are *withdrawn* in response to the replacement drawings including Figures 19A-19H and 20A-20C, submitted by the applicant on July 29, 2004.
- The rejections to claims 30-47 under 35 USC 112, first paragraph, concerning the "same substrate" set forth in the previous Office Action are *withdrawn* in response to applicant's amendment.
- The rejections to claims 30-47 under 35 USC 112, second paragraph, concerning the phrase "incident reflection light" and alternative language as in claims 32,33 44 and 47 set forth in the previous Office Action are *withdrawn* in the response to applicant's amendment.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
2. **Claims 30-47 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

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The specification and the claims fail to teach what is considered to be a “polarization hologram” as recited in the claims. It is not clear if the hologram will *polarize* light (i.e. creating a resultant light with a single polarization state) as it enters the hologram or if it will *effect* polarized light. The hologram seems to be **wavelength selective** yet no disclosure of the claims supports the hologram being “polarization”, to give definite meaning to the term.

Claims 31-42 and 44-47 inherit the rejection from their respective based claim.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 30-42 are rejected under 35 U.S.C. 112, second paragraph**, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the steps of forming the **periodic grating pattern on a birefringence film** by using a photomask in a lithographic process. It is impossible for the birefringence layer being “provided on a substrate” in a “periodic grating pattern” without any method steps such as lithographic process using mask or beam interference method using interfering light beams, to *from the periodic grating pattern*. Claims 31-42 inherit the rejection from their based claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. **Claims 30-32, 35-42 and 43-45, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Takeda et al (PN. 5,739,952) in view of the patent issued to Nakamura et al (PN. 5,244,713).**

Takeda et al teaches a *polarization beam splitter* that is comprised of a *holographic grating pattern* (Figures 1-3) formed with *birefringence film* (2) laying on a *substrate* (1). The birefringence layer (2) has an anisotropic property such that the *refractive indices* (n_o and n_e) of the layer for light propagates in the *ordinary* direction (S-polarization direction) and *extraordinary* direction (P-polarization direction) are different from each other. This difference in refractive indices will make the holographic grating imparting *different* phase value to the S-polarization and P-polarization components of an incident light which therefore will diffract the two components of light differently.

Takeda et al teaches that the holographic grating pattern of the polarization beam splitter is formed by first *depositing* a monomeric diacetylene film on a *substrate* and then polymerized it to form a polymer of diacetylene, which is an *organic polymer material*. The polymer material is then *rubbed* in *one direction to form the birefringence layer*. Takeda et al further teaches that a *resist* for forming a grating is applied on top of the polydiacetylene film to *form the grating pattern* in the film, (please see columns 8-9). The grating pattern is holographic because Takeda et al teaches explicitly that the grating may also be formed by two-beam interference method, (please see column 9, lines 1-5).

This reference has met all the limitations of the claims with the exception that although it teaches that polymer film is *rubbed* in one direction but it does not teach explicitly that the polymer film is stretched and heated to form the birefringence film. **Claims 30 and 43 have further been amended to claim to form a uni-directionally stretched birefringent layer.** However using uni-directional stretching and heating process to form birefringence film from an organic polymer film is rather well known in the art as demonstrated by the teachings of Nakamura et al wherein organic polymer film is heat treated and then uniaxially stretched, (i.e. uni-directionally stretched) to make the film have

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optimum birefringence, (please see column 4, lines 6-26). Nakamura et al teaches that polymer materials that can be made birefringent by heat treatment and stretching method include polycarbonates, polystyrene and polyamide resins, (please see column 2, lines 53-69). It would then have been obvious to one skilled in the art to use the well-known heating and uniaxial stretching method and the well known polymer materials as an alternative arrangement for making the birefringence film to be used as the birefringent layer for the holographic grating of Takeda et al for the benefit of cutting manufacture cost by using a conventionally accessible and known polymer materials and method for making the birefringent layer. Although these references do not teach explicitly that the organic polymer film is applied on a substrate and then removed from the substrate however such process has to be either inherently met by the disclosures of Takeda et al or disclosure of Nakamura et al in the step of preparing the organic polymer film before the heating and stretching treatment steps or an obvious modification to one skilled in the art since the organic polymer film has to be first formed on some substrate and the substrate cannot be included in the heating and stretching steps for it will interrupt such treatments for the film to make the birefringent film.

With regard to claims 31 and 44, in a different embodiment Takeda et al teaches that an isotropic layer (20, Figure 12) can be formed over the grating patterned birefringence film (2) to enclose the birefringence layer.

With regard to claim 32, Nakamura et al reference teaches that the suitable polymers that can be heat stretched to form birefringence film includes polycarbonate, polystyrene and polyamide film, (please column 2, lines 53-69). The modification would have been obvious to one skilled in the art since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regard to claim 35, Nakamura et al teaches that the heat stretching process is done at a temperature between 190 to 230 °C. Although it does not teach explicitly that it is heated at 350 °C but

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such feature is considered to be obvious modification since at either temperature the same result namely heating the organic polymer film in the processes of forming it a birefringence film is achieved.

With regard to claims 37-39, these references teach many different examples of birefringence film with different refractive index in the ordinary and extraordinary direction, however they do not teach explicitly to have the particular values claimed in the claims. But such modification is considered to be obvious matters of design choices to one skilled in the art to make the birefringence film with desired refractive indices so that the polarization beam splitter with the holographic grating pattern will behave as desired.

With regard to claims 40 and 41, Takeda et al teaches that the optical path difference for the ordinary and extraordinary light paths for the grating patterned birefringence film with the grooves of the grating pattern formed with isotropic material are denoted by equations 26 and 28, i.e.

$$\text{OPD (o)} = (n_o - n_c) * d_2 * k, \quad \text{OPD(e)} = (n_e - n_c) * d_2 * k,$$

Wherein n_o and n_e are the refractive indices of the birefringence film for the ordinary and extraordinary direction and n_c is the refractive index of the isotropic layer and d_2 is the grating height and k is $\lambda/2\pi$, λ being the wavelength. Takeda et al teaches that in order for the ordinary light or the extraordinary light to be not diffracted by the grating the optical path length difference has to be an even multiple of π , i.e. $2m\pi$, and in order for them to be diffracted the optical path difference has to be an odd multiple of π , i.e. $(2m+1)\pi$. Takeda et al teaches that the beam splitter including the holographic grating is designed to totally diffract one component of the beam and leaves the other not diffracted, (please see column 7, lines 18-24). This then requires one of the optical path difference equals $2m\pi$ and the other equals $(2m+1)\pi$. This then gives the following results:

$$\text{OPD(o)} = 2m\pi = (n_o - n_c) * d_2 * k, \text{ which gives } (n_o - n_c) d_2 = m \lambda, \text{ and}$$

$$\text{OPD (e)} = (2m+1)\pi = (n_e - n_c) * d_2 * k, \text{ which gives } (n_e - n_c) * d_2 = (2m+1) \lambda,$$

Or,

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$$\text{OPD(o)} = (2m+1)\pi = (n_o - n_c) * d2 * k, \text{ which gives } (n_o - n_c) d2 = (2m+1) \lambda, \text{ and}$$

$$\text{OPD (e)} = 2m\pi = (n_e - n_c) * d2 * k, \text{ which gives } (n_e - n_c) * d2 = m \lambda.$$

With regard to claim 42, these references do not teach explicitly to use spin coating for applying the organic polymer to the substrate, however such process is extremely well known in the art, such modification would have been obvious to one skilled in the art as an alternative means to apply the polymeric film on the substrate.

With regard to claim 45, Takeda et al teaches that the thickness of the birefringence layer may be greater than the grating height as shown in Figure 4. Although it does not teach explicitly to have the isotropic layer overlaid the birefringence layer, such modification would have been obvious as indicated by the disclosure of Figure 12 for the benefit of protecting the holographic grating from damages.

7. Claims 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Takeda et al and Nakamura et al as applied to claim 30 above, and further in view of the patent issued to Yoshimi et al (PN.5,245,456) and Yamamoto et al (PN. 6,040,418).

The polarization beam splitter comprises a holographic grating taught by Takeda et al in combined with the teachings of Nakamura et al as described for claim 30 above have met all the limitations of the claims. These references however do not teach explicitly that the organic polymer material comprises polyimide and the polyimide film is obtained with the claimed acid and solvent solution. Yoshimi et al in the same field of endeavor teaches that polyimide resin shows positive birefringence which is then a suitable birefringent polymer material. Yamamoto et al in the same field of endeavor teaches that it is standard knowledge in the art to prepare polyimides using polyamide acid with solvent, (please see columns 1 and 2). It would then have been obvious to one skilled in the art to apply the teachings of Yoshimi et al and Yamamoto et al to prepare polyimide film as an alternative suitable polymer material for the birefringent film. Since it has been held to be within the general skill of

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a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

8. Claims 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Takeda et al and Nakamura et al as applied to claim 43 above, and further in view of the patent issue to Iwatsuka et al (PN. 5,245,471).

The polarization beam splitter including the holographic grating taught by Takeda et al in combination with the teachings of Nakamura et al as described for claim 43 above have met all the limitations of the claims. These references however do not teach to have the features of having a second substrate formed with an adhesive layer as the isotropic layer. Iwatsuka et al in the same field of endeavor teaches a polarizer including grating pattern formed in birefringence layer wherein a second substrate (19, Figure 6E) is formed on top of an adhesive layer (18) serves as the isotropic layer that fills the grooves of the grating patterned birefringence layer (4). It would then have been obvious to one skilled in the art to apply the teachings of Iwatsuka et al to modify the design of the beam splitter of Takeda et al accordingly for the benefit of providing the polarization beam splitter with easy handling.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. **Claims 30-47 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,618,344 in view of the patent issued to Nakamura et al (PN. 5,244,713).**

Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claimed a polarization hologram with grating pattern formed in a birefringence layer such that the birefringence layer is a heat stretched organic polymer material. Claims 30 and 43 have been amended to include the feature having the birefringent layer being *uni-directionally stretched*. Such feature however is not a patentable distinct feature for it is a common practice in the art to form the birefringent film layer by using uni-directional stretching method as disclosed by Nakamura et al.

Response to Arguments

11. Applicant's arguments with respect to claims 30-47 *concerning the newly amended features* have been considered but are moot in view of the new ground(s) of rejection.

12. In response to applicant's arguments concerning the rejections of the phrase "polarization hologram" under 35 USC 112, first paragraph, the applicant is respectfully reminded that the cited specification in the remark teaches about the diffraction property of the hologram, (i.e. passes p-polarized incident light and diffracts s-polarized incident light), with respect to the polarization state of the incident light is NOT in the claims. Claim 30 actually claims that the diffraction property of the hologram is based on *wavelength*, not polarization. The "polarization hologram" recited in claims 30-47 therefore is not supported or the support is not clearly established in the claims by the disclosure of polarization hologram as applicant disclosed in the specification.

13. Applicant fails to provide an argument with respect to the rejections under 35 USC 112, second paragraph, concerning the lacking of critical step of forming the grating pattern using a photomask in

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photolithographic process or and interference method. *These rejections therefore still hold.* Applicant is respectfully noted that since the “grating structure” is an *essential* element in the claim and the claims are drawn to *method* of making the *hologram essentially contains the grating structure*, the method step concerning **how** to form the grating structure becomes critical and essential step to the method process. The method steps as stand in the claims **only** give support for making a *birefringent layer*, but not a polarization hologram. The applicant is respectfully reminded by providing a birefringent layer on a substrate will NOT make a polarization hologram.

14. In response to applicant’s arguments concerning the cited Takeda et al reference teaches that the birefringent film comprises two birefringent layers or a combination of two birefringent layers of same molecule orientation which is different from the instant application, the examiner respectfully disagrees for the reasons stated below. The applicant is respectfully invited to study the cited Takeda et al reference more closely and to find that the manufacture of the birefringent film **does not** depend on using or *combining* two separate birefringent layers, since as explicitly taught by Takeda et al the second identical birefringent layer is added **ONLY** if the first layer does not have the desired thickness, (please see column 8, 25-30). A single polymerized and stretched layer, formed at the first step, already has the birefringent property.

Conclusion

15. Applicant’s amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH**

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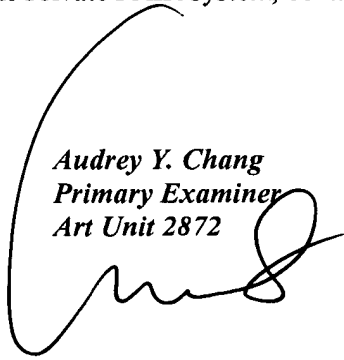
shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A. Chang, Ph.D.



*Audrey Y. Chang
Primary Examiner
Art Unit 2872*